Jun Li
Environmental Restoration Operations
The groundwater at Technical Area-V (TA-V) at Sandia National Laboratories (SNL) is designated an Area of Concern (AOC) in the Compliance Order on Consent.

TA-V is an industrial area in the west-central portion on Kirtland Air Force Base (KAFB). The area of TA-V is approximately 35 acres.
TA-V Groundwater Area of Concern

Site Description

- SNL activities at TA-V began in 1961 and involve operating research reactors.
- All the surface and shallow subsurface contamination has been addressed and corrective action is complete. Now corrective action is required only for the groundwater at TA-V.
Groundwater at TA-V occurs in the Regional Aquifer that resides in fine-grained, clay-rich, alluvial fan sediments. The water table is approximately 500 – 520 feet below the ground surface at TA-V.

Current monitoring network consists of 18 wells.

Groundwater is contaminated with nitrate and trichloroethene (TCE) at concentrations above the U.S. Environmental Protection Agency maximum contaminant levels (MCLs) for drinking water.

No other constituents in TA-V groundwater exceed the MCLs.
TA-V Groundwater Monitoring

- Nitrate plume covers approximately 1.4 acres.
- Trichloroethene plume covers approximately 13 acres.
- Both plumes are stable. Neither plume is moving away from TA-V.

<table>
<thead>
<tr>
<th>Constituent of Concern</th>
<th>Maximum Concentration in 2019</th>
<th>MCL</th>
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</thead>
<tbody>
<tr>
<td>Nitrate</td>
<td>15.3 milligrams per liter</td>
<td>10 milligrams per liter</td>
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<td>(well TAV-MW10)</td>
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<tr>
<td>Trichloroethene</td>
<td>20.2 micrograms per liter</td>
<td>5 micrograms per liter</td>
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<td></td>
<td>(well LWDS-MW1)</td>
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</tbody>
</table>

Source: 2019 Annual Groundwater Monitoring Report, Nitrate Plume (left) and TCE Plume (right)

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Groundwater Monitoring

- Groundwater in this area is not used for any purpose.
- Nearest downgradient drinking-water supply well (KAFB-4) is 2.7 miles to the north.
- The plumes are not adversely impacting human health and the environment.
The plan of the treatability study is to deliver bioremediation solution using one injection well.

The objective is to evaluate the effectiveness of in-situ bioremediation as a corrective measure for the TA-V Groundwater AOC.

**Treatability Study of In-Situ Bioremediation at TA-V**
Groundwater at TA-V is aerobic, and biodegradation is not naturally occurring.

Bioremediation solution provides the nutrients and pH buffer for the bacteria to biodegrade nitrate and trichloroethene.

How large an area can be treated by the bioremediation solution injected?
The New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) is the regulator for the investigation.

The NMED Ground Water Quality Bureau (GWQB) issued the Discharge Permit DP-1845 to discharge bioremediation solution to groundwater using injection well.

Progress on the treatability study is provided to the NMED HWB and GWQB through quarterly reporting.
Injected approximately 531,000 gallons of bioremediation solution and 123 liters of trichloroethene-degrading bacteria from November 2018 to April 2019.

Injection well TAV-INJ1 and monitoring well TAV-MW6 are monitored for the performance of in-situ bioremediation.

One deep well and eight surrounding wells are monitored to determine potential impact on groundwater quality caused by the bioremediation solution injected.
Findings of Treatability Study at Injection Well TAV-INJ1

- Groundwater at injection well TAV-INJ1 has been maintaining optimal conditions for biodegradation.
- The inert tracer (bromide) injected with the bioremediation solution has reached monitoring well TAV-MW6.
- Dissolved oxygen level has decreased in the groundwater at well TAV-MW6; however, anaerobic condition is not established.
- No change in groundwater quality has been observed in the deep monitoring well and the eight surrounding wells.
Findings of Treatability Study at Injection Well TAV-INJ1

- Delivery of bioremediation solution was limited by low hydraulic conductivities of the aquifer at TA-V.
- Infrastructure at TA-V (buildings and utilities) limits installation of multiple injection wells impeding the success of the in-situ bioremediation technology at this site.
- Findings of the treatability study of in-situ bioremediation at injection well TAV-INJ1 were shared with NMED HWB in September 2020.
- Complete the two-year performance monitoring in May 2021.

That’s a wrap for the evening!